scatter the rays of shorter wave length, thus leaving the orange-red rays predominant in the emergent light. This view was speedily verified by a critical examination of the track of the traversing beam. A sensible turbidity was visible, in the darkened room, at the extremities of the column of water adjacent to the corks securing the glass plates; and the light diffused latterly at these portions, when examined by Nicol's prism, was found to be distinctly polarized. The emergent beam examined by the spectroscope, exhibited orange and red in full intensity; but the yellow and green were greatly diminished. Ten days later (January 2, 1879) the solar beam traversing the same column of water emerged much brighter than on Christmas day, and the tint was orange tinged with yellow and red. This long repose caused, doubtless, some of the resinous precipitate to become more generally diffused, or to subside, and thus diminished the turpidity of the liquid. The recognition of the dichroism imparted to water by the presence of finely-divided particles in suspension, serves, likewise, to harmonize the conflicting views promulgated by physicists who have studied the chromatic phenomena presented by this liquid. Some claim that the rays of higher refrangibility are more copiously withdrawn by absorption; while others maintain that the rays of longer wave lengths are more absorbed. In many cases the chromatic tints ascribed to selective molecular absorption are unquestionably due to selective diffuse reflection from the ultra-microscopical corpuscles which are held in suspension. (Vide Jamin's "Cours de Physique," 3d ed., tome 3, p. 447, *et seq.*)

ON THE IMPORTANCE OF ENTOMOLOGICAL STUDIES.*

"Occasionally, at the present day, we may hear insects and entomologists spoken of as 'bugs' and 'bug-hunters'—epithets applied in derision to what are regarded as petty objects and trivial pursuits. Such views only betray an ignorance which is equally pitiable and inexcusable. The study of insects has assumed an importance in its direct application to agriculture, horticulture and sylviculture, second to no other department of natural history. It has called to its aid some of the best intellect of the country. Its literature has become extensive and assumed a high rank. Our State governments, in response to demands made upon them, are appointing State Entomologists. Our General Government is making liberal appropriations for entomological work in the Department of Agriculture at Washington, and also for sustaining a special United States Entomological Commission, now in the third year of its operations, charged with the investigation of a few of our more injurious insects.

"The study of insects assumes an importance in this country far greater than in any other part of the world. No where else does mother earth yield in such variety and in such abundance her agricultural products; after supplying to repletion our own people, the excess is distributed to every quarter of the globe. Few, surprisingly few, of these varied products are native to our soil. Nearly all of our fruits, grasses, cereals and vegetables, and perhaps three-fourths of our weeds are of foreign importation—mainly from Europe. With their introduction, very many of the insects that preyed upon them were also introduced, or have been subsequently brought hither. But unfortunately for us, the parasites which preyed upon them and kept them under control, have for the most part, been left behind. As the result, the imported pests, in their new home, find their favorite food-plants spread out in luxuriant growth over broad acres, where they may ply their destructive work without hindrance or molestation, until some native parasites acquire the habit of preying upon them.

"The grand scale upon which our crops are grown as no where else in the world—demanding for their gathering the invention of special mechanical contrivances, and that horse power should be replaced by steam—has also as its attendant inevitable evil, an enormous increase of insect depredations. This may be illustrated by a reference to our apple-tree insects. * * * * * * "In like manner, any and every crop cultivated on a large scale offers strong invitation to insect attack, and wonderfully stimulates insect multiplication."

PROFESSOR J. A. LINTNER.

* From an address before The Farmers' Club, Onondaga Co. N. Y.

CLOUD COLORS.

This P. M., from about 3.30 to sunset, I was witness to a remarkably vivid display of cloud-colors; and thinking that a full description of the phenomena may perhaps help to the understanding of the conditions of the higher atmosphere, I have written out what I saw. The day had been the warmest of the season. The night before was cloudy, and the temperature hardly fell below the freezing point. Light clouds prevailed through the day; at 3.30 the standard and maximum thermometers stood together at 62°, while the maximum sun thermometer registered 119°. The day had been quite still, the direction of the very light wind being from the S. E. The clouds in the neighborhood of the sun were of two varieties, the lower a fleecy and tufted cloud of the cumulus order, moving pretty rapidly from a little north of west, and frequently exhibiting a rapid spiral movement in the filaments, the other would be called cirro-stratus, though not precisely the typical cloud of that name, as portions were quite free from any appearance of structure. In the less dense portions an arrangement in parallel fibres was, however, quite apparent,—one set nearly horizontal, the other inclined at about 45°, the south end upward. The horizontal arrangement predominated, while the other was visible here and there in a detached streamer and occasionally in striæ upon the longer belts, which, hence, were not, as is usual with this cloud, striated perpendicularly to the direction of the bands. These cirro-stratus clouds, which also moved from the west, though with a much less velocity than the lower ones, were the only clouds which showed the rainbow colors. These were exceedingly intense, and changing every moment with such rapidity as to make it very difficult to decide upon the order of the colors, the more so as every filament had its own rainbow, and all were shifting. The red was, however, generally nearest the sun, though sometimes bordered inwardly with intense yellow. The most perfect succession of colors which I caught was in a cloud extending horizontally northward from the sun, in which for a brief interval all the seven colors could be traced following one another, not in the direction of the sun, but vertically, the red uppermost. The violet was, however, so very brilliant as to suggest the beginning of a new rainbow at its bottom, and in a moment this cloud had adopted the form which was most common throughout,—bands of red above and below, with a broader band between of yellow or green or blue. This blue tint was often exceedingly brilliant, tipping both ends of filaments, which were of dull hue in the centre, and bordered above and below with parallel stripes of red. A purple shade was occasionally distinct, surrounded by other colors. This undescribably beautiful display continued over the whole S. W. quarter of the sky, until the sun had been out of sight behind the mountains for more than half an hour.

Though the clouds upon which the colors were observed were of the order in which halos are formed, yet the appearance had very little in common with the halo,—of which we have had a good example within a week. The colors were not only not concentric, but were exhibited successively by different clouds in every direction from the sun, and *at all distances*, from 30°, or, perhaps, 40°, to